

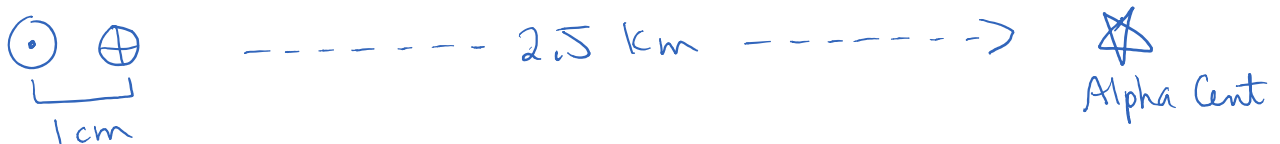
Distances in Space

February 16, 2015 2:21 PM

A. Units of Distance

1. Astronomical Unit (AU) - the average distance between the \oplus and the sun.
 ~ 150 million km = 8 light minutes
2. Light Year (ly) - the distance light travels in one year. $\sim 9.5 \times 10^{12}$ km
3. Parsec = 3.26 ly

ex Alpha Centauri - nearest star to the sun at 4.3 ly away
- if \oplus is a dot 1cm from sun (\odot) then Alpha Centauri would be 2.5 km away.



B. Ways to Measure Distance in Space

1. ruler or space probe - space is too large
2. red shift - the faster a star is moving away from us (larger red shift), the further away it is. - used for distant galaxies.
3. Cepheid Variables - these are variable stars that expand and contract, causing their

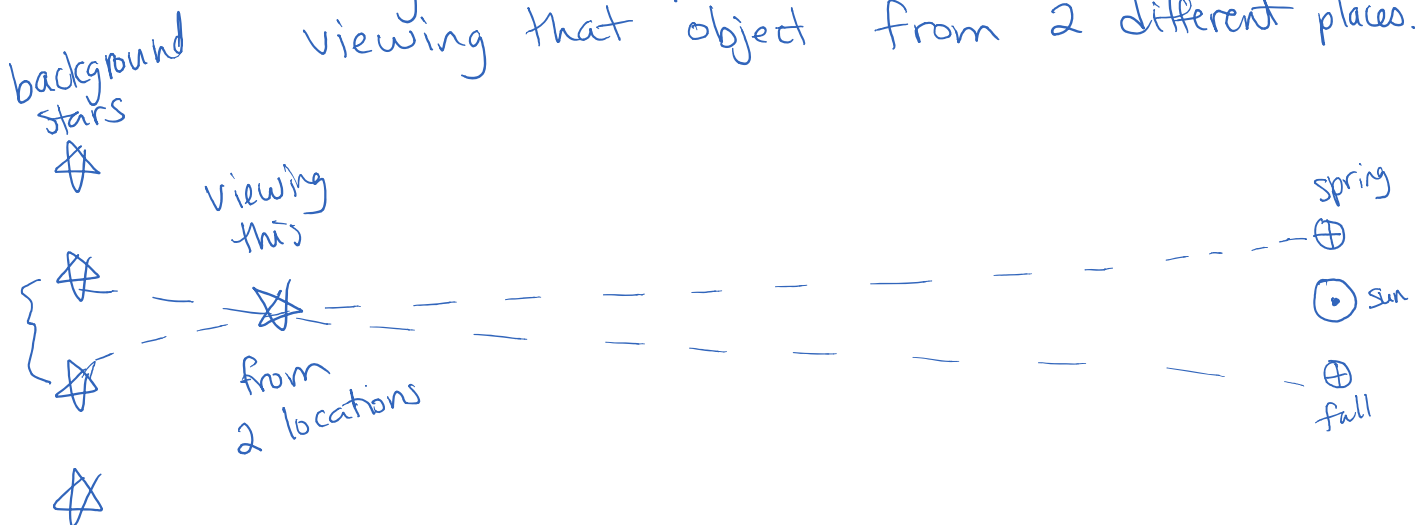
brightness to change (vary).

The absolute magnitude is related to the period (time) of pulsation. The longer the period, the brighter the star.

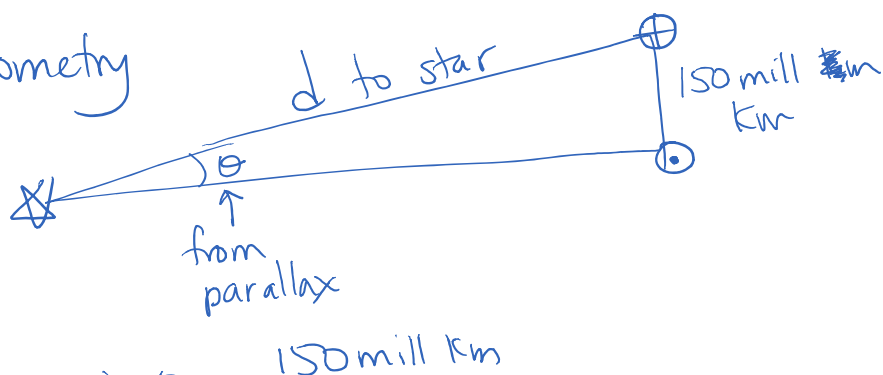
ie a cepheid with a period = 50 days (long) is very bright, but if it appears dim to us it must be very far away.

— used for distances to stars in our galaxy and other galaxies.

4. Parallax — the apparent displacement of an object when it is viewed from 2 points.
— the amount of movement of the background compared to a closer object by viewing that object from 2 different places.



Use simple trigonometry



Works well for close stars

for close
stars

parallax

$$\sin \theta = \frac{150 \text{ mill km}}{d}$$

$$d = \frac{150 \text{ mill km}}{\sin \theta}$$

← from parallax